Section 1: Cover page

Identifiers and Contacts

Title:	Reinvention Government in Michigan through Analytics Yields $1 Million in Financial Benefits Each Business Day
Category	Data, Information and Knowledge Management
Name of State Agency	State of Michigan, Department of Technology, Management & Budget (DTMB)
Name of Project Manager or Contact: Name, telephone, e-mail	David Bengel Manager, Enterprise Monitoring and Platform Services 517-241-2921 bengeld@michigan.gov Michigan Department of Technology, Management & Budget
Project initiation and completion dates:	Initiation: May 2010 Completion: February 2011

Section 2: Executive Summary

Description of the Business Problem and Solution: Michigan places innovation, performance and customer service at the forefront of its state government, which requires a smart government platform for business intelligence and advanced analytics to make value-based decisions.

Michigan's departments and agencies had become data rich, but had limited ability to transform the data into usable information. Michigan knew this information could help deliver better services to citizens and reduce the costs to taxpayers. The Michigan Department of Technology, Management & Budget (DTMB) had a history of success with harnessing the power of data through data warehousing beginning with Medicaid claims. A major review of the EDW environment in 2010-2011 led to service enhancements that have increased the value and use of the State Enterprise Data Warehouse (EDW). Optum Insight was awarded the new contract with Teradata as the EDW vendor.

Significance of the Project to the Improvement of the Operation of Government: Michigan has been very ambitious in its efforts to solve many real-life problems through the innovative sharing and comprehensive analyses of data. Michigan is a leader in the way it shares data and information to deliver analytics and decision making to serve citizens and reduce costs borne by taxpayers.

Use of the system and the volume of data analyzed by clients on the EDW have increased. Nearly 10,000 users in five major departments, 20 agencies and more than 100 bureaus now rely on the EDW to do their jobs and serve residents through business intelligence and analytics. DTMB uses technology in innovative ways which is easily transferable to other government agencies.

Benefits of the Project: Michigan's advanced analytics and actionable insights help achieve $1 million per business day in financial benefits (based on 250 state working days), mostly in the Medicaid/health and human services area. An ROI of 15 to 1 has been achieved while also helping serve Michigan's citizens. The Department of Community Health is achieving $200 million in annual financial benefits each year, plus another $75 million with the Department of Human Services. These savings are in the areas of program integrity benefits (including identifying fraud and abuse), cost avoidance due to improved outcomes, sanction avoidance and operational efficiencies. Part of that total includes $97 million recovered in inappropriate payments within its Medicaid program. This total does not include additional savings from efficiencies in the courts, Department of Treasury, or other departments using the EDW.

In addition, the various departments and agencies empowered by the system can uncover trends that previously would have remained hidden.

Section 3: Business Problem and Solution Description: Michigan is working to reinvent itself and its state government so that it runs efficiently and serves its citizens as customers, placing innovation, performance and customer service at the forefront. Creating such a government requires value-based decision-making, which, in turn, depends strongly on being able to identify the results of the state's efforts and understanding what actions and circumstances led to those results.

Michigan's agencies had become data rich, but had limited ability to transform this data into usable information. The state's more than two dozen departments and agencies collect a tremendous amount of information for internal use, and for state and federal reporting purposes. Combining this data with data from the U.S. Census, payment systems and other state agencies could create a potential gold mine of knowledge that could help to deliver better services to citizens and reduce the costs borne by taxpayers – provided administrators have easy access to it.

DTMB decided to harness the power of the data collected across state agencies, beginning with implementation of a data warehouse in the mid-1990s to monitor Medicaid claims for quality of care, overpayments, fraud and abuse. Quickly, the solution evolved with Michigan's needs to become an enterprise EDW model.

In 2010, DTMB decided to validate its EDW strategic direction by competitively bidding the State's current and future EDW business requirements. As a result of the competitive bid process, the State was able to procure three new EDW platforms to refresh its entire EDW architecture (Production, Disaster Recovery and Test environments in the State's consolidated Hosting environment that serves multiple segments of government with multiple security zones and firewalls) and still save the State over $2.8 million from existing EDW expenditures. The migration to the new platform in February 2011 was a significant accomplishment, with the EDW drawing data from 120 distinct statewide sources and holding 12.13 terabytes of data in 18,706 tables across 660 databases.

Optum-Insight was awarded the 10-year contract in November 2010, with Teradata Corporation continuing as the EDW vendor. A very aggressive implementation date was set for February 2011, due to the need for services to meet the State's growing EDW business requirements and client requests for additional data storage. A detailed project plan was prepared to coordinate efforts across 10 agencies and two vendors to meet tight deadlines and high expectations for the critical enterprise service. DTMB developed and executed a comprehensive communications plan, which included communicating with all stakeholders, executives and business users at each agency to keep them informed of the projects schedule and new service offerings. DTMB also offered online and in-person training for each agency.

In addition to the refresh, several new enhancements were included to help extend the value of the EDW to clients:

- Encryption for sensitive data at rest with Protegrity DPS

- Implementation of Active/Active architecture to ensure high availability for mission-critical data, and adding the ability to balance workloads across the platforms while enhancing the Disaster Recovery capacity and capability.
- Added Capacity on Demand feature that allows the State the capability of doubling the CPU and I/O over the life of the platform without needing to acquire additional hardware.

DTMB is working to add even more advanced analytical approaches so the EDW can be further leveraged as a key tool to deliver the right information at the right time to executives. With this information, employees will have the ability to deliver intuitive solutions that leverage historical, real-time and predictive information. This is more important than ever in today's economy.

Michigan's EDW BI/Analytic project has the potential to be a national model for other States to leverage information for shared service models. The future of government technology relies upon the ability to deliver efficient, reliable enterprise solutions using multiple channels, and to include innovative uses of data sharing and BI across the enterprise.

Section 4: Significance: In 2010, Michigan Governor Rick Snyder put forth an ambitious agenda designed to re-invent Michigan. This vision centered on what he called "Michigan 3.0, the era of Innovation" which followed "1.0", an economy built on the use of natural resources, and "2.0", the industrial era. The goal was to focus on unleashing the creativity of entrepreneurs and innovators to help the state grow and compete in the global economy, which included re-inventing government to run efficiently and serve its citizens as customers.

With the implementation of the new service completed in February 2011, Michigan's EDW makes a substantial contribution to fulfilling the governor's vision by providing an enterprise service for business intelligence and business analytics. Michigan is very ambitious in its attempts to solve many real-life problems through innovative sharing and comprehensive analysis of data.

Michigan's approach to business intelligence (BI) and data warehousing (DW) has always been "enterprise" (statewide) in nature, rather than separate BI or DW platforms for each business unit or state agency. By removing barriers to the sharing of data across business units, Michigan leverages massive amounts of data to create innovative approaches to the use of BI, analytics and data warehousing in enabling *smart government*.

The EDW enables the linking of data across multiple data sets and the sharing of data among multiple state departments, including the Department of Community Health (MDCH), the Department of Human Services (DHS), the Department of Corrections, the Michigan State Police, the State Court Administrators Office, the Department of Natural Resources, the Department of Licensing and Regulatory Affairs (DLARA), the Secretary of State and the Department of Treasury.

With the addition of new advanced analytical software tools such as Predictive Analytics, the state is positioned to gain even more value from the EDW to address challenges. This tool set will greatly assist departments in identifying programs yielding the highest future value and actions most likely to achieve “Michigan 3.0 goals”.

Following are some examples of successful use of the EDW:

Department of Human Services (DHS): Michigan’s creative use of data gathering from many state department sources for child support parent locator purposes is an example of how this enterprise approach has helped Michigan recover millions of dollars in child support for its children. The state leverages data from the Secretary of State’s motor and vehicle licenses, the Department of Natural Resources’ hunting and fishing licenses and campground reservations, Corrections inmate incarceration data, and professional license data, etc. Using the EDW as its information backbone, and utilizing advanced analytics, the DHS Office of Inspector General has implemented some of the most innovative fraud detection methods in the country to fight fraud in the child day care program as well as the food and cash assistance area.

Department of Community Health (MDCH**):** MDCH can monitor the cost and care associated with a single individual across multiple programs. The EDW has been instrumental in improving the administration of healthcare services, conducting advanced healthcare analysis to determine patterns; assessing which programs are most effective, detecting and reducing fraud, waste, and abuse, improving and interpreting disease management and epidemiological patterns, improving healthcare outcomes, streamlining operations and serving as a basis to help drive future HIE initiatives. In addition, the EDW supports MDCH with Birth Outcomes and Enhanced Prenatal Services, identifying high-risk children for influenza vaccinations, healthcare analysis and outreach in partnership with Michigan State University, birth defect tracking, the Asthma Mortality Review Project, the Michigan Lupus Epidemiology and Surveillance (MILES) Program, long-term care, and substance abuse.

Department of Treasury: Treasury uses the EDW to evaluate legislative tax proposals to determine tax revenue implications to Michigan. By running simulations to evaluate possible revenue replacements for the $1.8 billion dollar Single Business Tax (SBT), the State Treasurer can quickly react to revenue proposals. The EDW is also used to identify and track revenue collection patterns, trends, and anomalies. With further analysis, an underlying cause can be determined; possibly industry economic or individual taxpayer situations. Treasury also uses the warehouse to ensure tax compliance. Its tax auditors now review over 452,000 returns annually. Previously, they were only able to review approximately 6,000 paper files.

Judicial Data Warehouse: Name Search Application. This web-based application is widely used by multiple departments, police and sheriff’s offices across the State, and the Department of Corrections to query statewide court history on an individual. There are currently 226 courts and over 36 million cases in this application.

Section 5: Benefit of the Project:

Alignment with NASCIO's 2012 State CIO Priorities: The EDW project specifically contributes to the top three NASCIO priorities – the consolidation and optimization of services, budget and cost control and improvement in IT governance. In addition, the system aligns directly with other priorities, such as "security" the EDW's encryption-at-rest capabilities and "maturing state portal and e-government accessibility" via data access partnerships with universities (University of Michigan and the State of Michigan's Office of Child Support). The EDW's primary function is "business intelligence and business analytics," which also aligns with the NASCIO priorities.

Michigan shares information to deliver better services to citizens and reduce the costs borne by taxpayers. The analytic data solution helps achieve $1 million per business day in financial benefits (based on 250 state working days), mostly in the Medicaid/health and human services area. An ROI of at least 15 to 1 has been achieved, while also helping better serve the citizens of Michigan.

Michigan recently publicly documented that the EDW helps achieve $200 million in annual financial benefits within the Michigan Department of Community Health (DCH) alone each year. These financial savings are in the areas of program integrity benefits (including identifying fraud and abuse), cost avoidance due to improved outcomes, sanction avoidance and operational efficiencies. Part of that total includes $97 million recovered in inappropriate payments within its Medicaid program. This total does not include additional savings from efficiencies in the courts, Department of Treasury, or other departments using the EDW.

Improving Citizen Well-Being: As a Medicaid/public health agency, DCH uses the data warehouse as a broad-based BI solution to manage its health care programs and outcomes. DCH has integrated 12 separate health-related program areas, encompassing 34 separate data sources, into a single environment. Today, DCH can monitor the cost and care associated with a single individual across multiple programs. The data warehouse has since become a critical and productive part of the agency's efforts. For example, a dramatic reduction in cases of child lead poisoning was achieved using the data warehouse as an analytic tool combined with other outreach efforts. The state reduced the number of cases of lead poisoning by 35%, and increased the number of Medicaid-enrolled 3-year-olds screened for lead from below 50% to 72%.

Big Data Platform: The EDW centralizes massive amounts of disparate data from over 3,900 platforms in Michigan's consolidated Data Center, serving all state agencies. Michigan will also be adding non-traditional data (Security and social media data) in the future, with the EDW serving as the consolidated platform to perform advanced business analytics on non-traditional (big) data.

Michigan is advanced in the way it shares data and information to deliver services to citizens and reduce the costs borne by taxpayers. In general, without the EDW, most of the time would be spent *looking* for data, rather than *analyzing* it. Michigan has been

very ambitious in its attempts to solve as many real-life problems through the innovative sharing and comprehensive analysis of data. The EDW solution is a best practice using existing technologies, solutions and processes that are transferable to other states and their agencies regardless of their level of business analytics maturity.

The analytic solution helps uncover trends that previously would have remained hidden. It allows for the innovative uses of data sharing and business intelligence across the enterprise. Agencies have become more aware of the business needs of their counterparts in other state departments, and data sharing agreements have formed to facilitate the sharing of important decision data.

The system is an important asset for Michigan that has been leveraged successfully and will be further targeted to play a prominent role in helping Governor Snyder achieve his ambitious “Michigan 3.0” goals.